A STUDY IN FISH MORPHOLOGY.

Pleuronectes. Liverpool Marine Biology Committee's Memoirs on Typical British Marine Plants and Animals. No. viii. By F. J. Cole and Jas. Johnstone, B.Sc. Pp. 252; 11 plates, 5 text figures and a table. (London: Williams and Norgate, 1901.) Price 7*s*.[1]

OF the now numerous publications of the Liverpool Marine Biology Committee which have appeared since its foundation, none are of greater service to zoologists and students than those of the series to which the volume under review belongs. They are each a detailed study of some individual organism, prepared by a writer or writers specially familiar with the group to which it belongs; and under this guarantee of authority, they are consequently welcome and most useful wherever the zoology of the British seas is studied or taught. The first memoir, on the "Ascidian," by Prof. Herdman (to whom honour is due for having inspired and initiated this most admirable series), appeared but in 1899; and in the interval of little more than two years which has elapsed, there have been published seven others—the present volume being the eighth. In bulk and descriptive detail, this is by far the most extensive and elaborate yet issued, since it is nearly three times the size of its heaviest predecessor, and is illustrated by eleven plates as compared with a previous maximum of seven. When, however, it is remembered that it has two authors and deals with a verteb rate, and that it exhausts not only the organology, but treats of the life-history, habits and economic aspects of the fish selected for treatment, it is evident that a just allocation has been given it. Indeed, in its method of treatment it is at once both wider and more special than its predecessors.

Both authors have already so distinguished themselves as trustworthy investigators, at Liverpool and elsewhere, that their cooperation gave promise of a good result, and in the end our highest expectations have been fulfilled.

The introduction to the book opens with a consideration of classification, the value of the Müllerian subordinate term "anacanthini" (now unquestionably doomed) and of the less familiar "heterosomata" being duly explained. In dealing with the external characters, the more recent work on chromatology is adequately incorporated, with due mention of authority; and while the descriptions of the lateral line organs and scales are fully up to date, and the "breathing valves" are duly recognised, slight error is obvious only in the application of the terms descriptive of the condition of the tail to that organ and not the fish itself. The subjects of torsion and asymmetry, as involving the head and dorsal fin and leading up to accurate definitions of the "eyeless" and "ocular" sides, are extremely well handled, both in this introduction and in a subsequent section, following that treating of the eye-muscles, which play so important a part in the processes involved and in furnishing a clue to their real nature. Rival theories are discussed, to the denunciation of those of Cunningham, based upon the study of the sole, certain other of whose observations come in for criticism in many pages of this work.

The osteological chapters come next in order of succession, and they are thoroughly good and sound. The bones of the "eyeless" and "ocular" sides are alternately described; the compound nature of the pterotic and sphenotic elements is fully considered, in its bearings on both morphology and terminology; the absence of the left nasal is explained; and the details in respect to which the inter-maxillary cartilage enables the plaice (in contradistinction to other Pleuronectidæ) to pick up food on its eyeless side, are made admirably clear. The vertebral column and fin-supports are fully considered; and while we doubt the advisability of retaining the term "atlas" for the first vertebra, we welcome the adoption of "axonost" and "baseost" and the recognition of the work of Traquair, Bridge, and others who are named. We regret, however, that while our authors were thus far revising their terminology they did not, for once and for all, replace the term "anal" in ventral for the post-anal median fin.

Concerning the anal spine, it is noteworthy that the authors have been at immense pains to be perfectly sure that this does not project uncovered during life; and it may be said that no less labour has been bestowed upon the accurate determination of the nature and precise limitations of the pancreas, the lymphatic portion of the head-kidney, the thymus gland, and other organs which text-book writers are too apt to sketchily consider. Their desire to be thorough at all costs is, in fact, one of the distinguishing features of their book; and consequently, we find descriptions of the adult supplemented by comparison with the young, as in their account of the development and retrogression of the thymus, of the thyroid and suprarenal organs, of the hypoblastic origin of the "bladder" (which we rejoice to find termed the *urocyst*) and other allied parts. In all this and a great deal more their memoir is a record of laborious research, done for the love of the work and with the determination to be exact; and no less praiseworthy are their literary efforts, which have led them, when called upon to deal with things of doubtful homology or function, to state fully alternative possibilities, with due reference to authority, as, for example, in their treatment of the "interclavicle" and the "pyloric cæca."

The section dealing with the blood vascular system calls for no especial comment, except that it is accurate and well done, and that a good service has been rendered in a *résumé* of the chief conditions assumed by the pseudobranchial vessels. The authors' extreme caution is again obvious, in their refusal to decide upon the homology of this pseudobranch (in the absence of a related afferent branch of the ventral aorta) until dealing with its innervation. And this leads naturally to the consideration of their section on the nervous system, which, as might be expected from the senior author's work, is their *pièce de résistance*. In the portion of this which deals with the cranial nerves, we are taken at once into a dissertation on the two-root law of Bell and the four-root theory of Gaskell; and, apropos of the far-reaching investigations of Strong and the labours of Herrick on Menidia, to a classification, based on the "component theory" and work done under the conviction that the whole course of these

[1] Like three of its predecessors, which were written wholly or in part by members of the staff of the Lancashire Sea Fisheries Laboratory, the memoir is also incorporated as an Appendix in their Annual Report Rep. x. 1901).

nerves should be determined by means of serial sections. Rather too much this to expect from the ordinary student! especially when it is seen that the classification discriminates between five systems (viz.—somatic-afferent and -efferent, viscero-afferent and -efferent, and acustico-lateral) "each delimited by a uniformity of peripheral termination and a special characteristic origin in the brain," and each liable to "appear in a variable number of cranial nerves as a component of those nerves." Our authors tell us they have adopted this method for the plaice, and in proceeding to the systematic description of its cranial nerves they deal with them in order of functional association. The olfactory, optic and eye-muscle nerves are first considered; then the fifth and seventh; after the study of their root-ganglia, the eighth, ninth and tenth, completing the series. With the spinal nerves, the fourth is described first, and the first three later in order of succession, because they are less typical and by virtue of their especial relationships to the pectoral member. It is impossible here to go more fully into the details of this very technical subject; suffice it to say that all is most admirably set forth, and that while a really good description of the sympathetic system is given which may serve as a model to writers of the future, both the giant cells of the cord and the most recently revived Reissner's fibre are described and discussed with full bibliographic treatment. Special discussion is given to the question of the innervation of the pelvic member, in its bearings on translocation and nervous substitution, as a guide to homology. The authors' arguments under this head have an especial interest, in the recent announcement by Dr. A. Smith Woodward of the startling discovery that, in Cretaceous times, teleostei of the clupeoid type had already translocated the pelvic fin into the jugular position.

Following this are sections dealing with the sense organs. Kyle's discovery of a pleuronectid with a naso-pharyngeal aperture and Holt's "recessus orbitalis" meet with due recognition, and here again all is admirable and fully up to date. The aforementioned thesis on asymmetry is conveniently introduced at this point, and there follow sections on the ear and reproductive organs, with a *résumé* of the present state of our knowledge concerning the sexual organs of the female teleosteans in general, in which Huxley's terminology is employed.

The book closes with an appendix, containing valuable information on spawning and the spawning season, on the maturation and structure of the egg, on oviposition, fertilisation, development and metamorphosis. Rate of growth, the nature and causes of migration and distribution, are duly dealt with, and there follows a brief sketch of the plaice fishery in northern European waters, with some sound advice to the practical fisherman. In not a few pages in the book there are hints as to the work of the future, as, for example, at the very outset, where there are described a sporozoon and a myxosporidian yet to be determined.

Of the eleven plates, all are admirably clear, and figures useful as are those of the cranial nerves, the olfactory sacs and the sympathetic system are most welcome. It is well known that in the production of this series of memoirs the cost of illustration has been largely defrayed by private donation. In the present case the publication committee of the Victoria University have performed this graceful task, and we congratulate its members upon their bargain. A better treatise on a single animal form there hardly exists, and while we would tender to editor, authors and all interested or concerned our heartiest thanks, we cannot refrain from an expression of national pride, in the extent to which it is evident from the pages of this work that the science of comparative ichthyology is essentially English. The book reflects the influence of the schools in which its authors were trained, and is a credit to them and to science in Britain. Our only fear concerning it is that it will be found too voluminous for the mere student, of whom so much is expected in so short a time. There is a danger that at first glance he would be repelled by the great amount of detail, and that thereby the subject of zoology might suffer. Selection can, however, always be arranged under a competent teacher, and for those desirous of specialising in ichthyology we could recommend nothing better. The book is healthy in the extreme, and while it will educate the student on sound lines, it will arouse in him the desire for reinvestigation and research, no opportunity of directing attention to which has been lost.

THE GOLD OF OPHIR.

The Gold of Ophir: Whence Brought and by Whom? By A. H. Keane. Pp. xviii + 244. With one plate and one map. (London: Stanford, 1901.) Price 5*s.* net.

IN the little volume before us Prof. A. H. Keane has undertaken an inquiry into the vexed question of the site of Ophir, and the source of the gold which the Hebrew Scriptures assure us was brought from that place to Solomon, son of David, by ships of Tarshish. The author himself feels that some apology to the reader is necessary, and that some explanation is due to him for having taken up the subject at all, and it is our duty to say at the outset that we wish he had left it for discussion to the class of people who triumphantly assert that Rhodesia is Ophir, and that Britons inherit this colony (which was founded by masterful Mr. Rhodes) as their natural right because they are descendants of some of the tribes of Israel. Prof. Keane thinks that so much evidence has accumulated on the subject during the last thirty years that it is time the question was reopened, and not only reopened, but decided once and for all. The evidence he refers to consists of the results obtained from the exploration and study of Rhodesian remains, from the Himyaritic inscriptions found in central and southern Arabia by Glaser and others, and from the explorations of the "Arabian frankincenseland" by the late Mr. Bent, and from parallels between the social and religious customs of the Malagasy inhabitants of Madagascar and "their Himyaritic, Phœnician and Jewish masters from the northern hemisphere." Incidentally we may mention that Dr. Carl Peters, in 1901, enunciated the extraordinary view that, not only was the site of the Ophir of the Bible to be found in Rhodesia, but that Ophir was to be identified with the Punt of the Egyptian inscriptions.

Prof. Keane has devoted several chapters of his little